SMELLING HOW TO FEEL: DOES AMBIENT ODOR AFFECT HOW WE EVALUATE EMOTIONAL STIMULI?

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BACKGROUND

- Olfaction is strongly related to emotion, for example:
  - Odor-evoked memories carry a particularly strong affective component, as compared to other sensory modalities (Herz, Eliassen, Beland, & Souza 2004).
  - When frustration occurs in the presence of an ambient odor, later presence of the same odor can negatively impact motivation to complete puzzle tests (Herz, Schankler, & Beland 2004).
- Crossmodal neural connectivity occurs between vision and olfaction, with odor modulating attentional processing of visual cues (Seigneuric, Durand, Jiang, Baudouin, & Schaal, 2010).
- No study, to our knowledge, examined how olfaction impacts emotional processing of visual stimuli.
- Thus, the purpose of this study is to investigate whether the presence of a pleasant or unpleasant odor can affect hedonic ratings of emotionally-charged visual stimuli.
  - Sex effects will also be considered, as there is evidence of sexual dimorphism in olfaction for humans (Doty & Cameron, 2009).

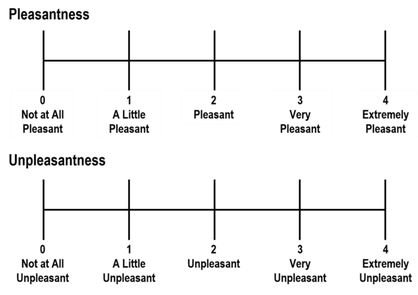

Figure 1. Hedonic Rating Scales.

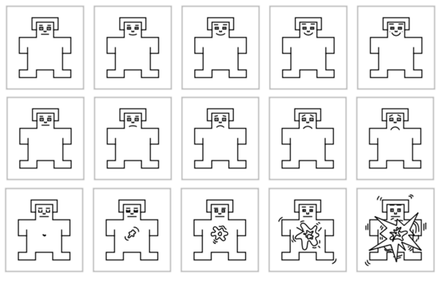

Figure 2. Self-Assessment Manikins (SAM) for pleasantness (top), unpleasantness (middle), and arousal (bottom)

PROPOSED METHODS

Sample

- Participants will be recruited from the student population at the University of Dayton using SONA. Students will receive course credit for their participation.

Materials & Measures

- **International Affective Picture System** (IAPS; Lang, Bradley, & Cuthbert, 2008): participants will be presented with images that have been previously rated as having positive, negative, or neutral emotional valence. Each participant will be presented with the same images, evenly divided between positive, negative, and neutral images, in a pseudorandom order **(Figure 3, bottom left)**.
- **Ambient Odor:** During the experiment, participants will either exposed to a pleasant odor (tangerine essential oil), an unpleasant odor (fish oil), or no odor (control). Odor will be delivered via odor diffuser.
- **Self-Assessment Manikins** (SAM; Bradley & Lang, 1994): Ratings of pleasantness, unpleasantness, and arousal for stimuli will be assessed using three five-point unipolar pictorial representation scale **(Figure 2, bottom left)**.
- **Positive and Negative Affect Schedule** (PANAS; Watson, Clark, & Tellegen, 1988): Participants will complete this scale as part of the pre-experiment survey and the experimental session, which is designed to assess current emotional state. Both the positive affect scales and negative affect scales have been found to have good consistency (PA: α = .89, NA: α = .85), as well as decent test-retest reliability (PA: α = .54, NA: α = .45).
- **Affective Impact of Odor Scale** (AIO; Wrzesniewski, McCauley, and Rozin, 1999): How much participant's liking of new things are affected by odor will be rated using this scale. Each item has participants rate how often odors impact their liking and disliking of new foods, places, products, and people on a four-point scale. This scale was found to have acceptable internal reliability (α = .73).
- **Odor Evaluation**: Participants will be asked about the odor present in the room and asked to rate it on dimensions of pleasantness, unpleasantness, and intensity using three five-point unipolar Likert-type scale **(Figure 1, left)**. This evaluation will serve as a manipulation check to determine if the odor within the room is perceived as accordingly pleasant or unpleasantness, based on condition.

References are available upon request.
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PROPOSED METHODS (CONT.)

Procedure

- At least three days prior to the experimental session, participants will complete a pre-experiment survey online. The survey will contain informed consent, the PANAS, the AIO, and 45 IAPS images. Participants will rate each image on pleasantness, unpleasantness, and arousal.
- On the day of the experiment, participants will be brought to a room containing one of the ambient odors or no odor, depending on condition
- Following informed consent for the study, participants will complete a demographic questionnaire and the PANAS again
- Next, they will be presented with the 45 IAPS images they had seen in the pre-experiment survey using MATLAB software. All images will be presented in a pseudorandom order
- Once all images have been presented, participants will rate the odor in the room for pleasantness, unpleasantness, and odor intensity

POTENTIAL IMPACT

- This would be the first study, to our knowledge, to examine the relationship between olfaction and emotional processing of visual stimuli.
- Findings could help to elucidate the complex relationship between vision, olfaction, and emotion.
- The methodology has the potential to be extended to clinical populations, as differential olfactory deficits have been recognized in populations such as schizophrenia, depression, dementia, and a number of neurodegenerative disorders (Atanasova et al., 2008).
  - This carries with it the implication that olfactory deficits could contribute to related deficits in neuropsychological processes.

Figure 3. Examples of images rated as having positive, neutral, and negative valence from IAPS